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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/781,786	02/12/2001	Kyung-Ju Choi	00-6AAF (DN7814)	6972

7590

04/11/2003

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EXAMINER

CECIL, TERRY K

ART UNIT

PAPER NUMBER

1723

DATE MAILED: 04/11/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/781,786

Applicant(s)

CHOI, KYUNG-JU

Examiner

Mr. Terry K. Cecil

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 2-3-2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-44 is/are pending in the application.
- 4a) Of the above claim(s) 19-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 and 28-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 12 February 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 03 September 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election of claims 1-18 and 28-44 in Paper No. 14 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Objections

Because of Applicant's amendment filed 8-27-2002, the objection to claim 10 of the final rejection mailed 7-16-2003 is withdrawn.

2. Claims 12-13 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form, or rewrite the claims in independent form.

Drawings

3. The drawings are objected to because of the following reasons (*cited previously in the final rejection mailed 7-16-2003*):

- The following reference signs mentioned in the disclosure are not shown in the drawings:
“43” (page 9). See 37 CFR 1.84(p)(5).
- The drawings include the following reference signs not mentioned in the disclosure: 21', 37', and 38' (figure 1b). See 37 CFR 1.84(p)(5).

Applicant is required to submit a proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. Objections to the drawings will not be held in abeyance.

Claim Rejections - 35 USC ' 112 (first paragraph)

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. Claims 1-18 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The specification has not adequately demonstrated how the calculations in e.g. lines 6-9 of claim 1 (and also lines 10-13 in claim 18) result in a filter media having the characteristic of lines 10-11 of claim 1, i.e. having an average overall pore size of the combined successive

thicknesses that is smaller than that of the average overall pore size of the that of the finest fiber thickness. Nor does the specification teach the skilled man how the aforementioned calculations effect how the filter media is made. The applicant has recognized that when two layers of filter media having differing average pore size values are combined together, the average pore size of the combined media will be smaller than the average pore size value of the finest fiber media. As shown in the publication authored by the applicant and entitled Air Permeability and Pore Distribution of a Dual-Layered Microglass Filter Medium in Vol. 6 of Advances in filtration and Separation Technology of the AFS Society 97-99 (1994), hereinafter "The A-P Reference", this smaller average pore size phenomenon occurs when a pore in layer 1 is placed on top of a differing size pore of layer 2, wherein the degree of smallness depends upon of the location of the interface between the two layers. Applicant has developed an alleged novel equation (i.e. equation 5 on page 12 of the specification that is also included in claim 18) that closely calculates what the average pore size of the combined layers will be experimentally by taking into account the porosity of each layer. *However, applicant has not explained how these calculations result in a novel layered filtration media nor how these calculations would help to one skilled in the art to make or use the layered media.*

Claim Rejections – 35 U.S.C 101 & 35 USC ' 112 (first paragraph)

6. Claims 28-44 are rejected under 35 U.S.C. 101 because the claimed invention is not supported by either a substantial and credible asserted utility or a well established utility. Claims 28-44 are geared to "a method of calculating filter media". However, as explained above, it has

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not been shown how such calculations result in the creation of a novel media or any tangible and concrete result. Therefor, the claims have been rejected under 35 U.S.C. 101.

7. Claims 28-44 are also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is not supported by either a substantial and credible asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

Claim Rejections - 35 USC ' 112 (second paragraph)

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 28-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The claims are rejected because of the following reasons:

- In claim 28, word(s) are missing after "A method of calculating" and before "filter media". Did applicant intend to claim "A method of calculating the average pore size of a filter media..."? or "A method of calculating the air frazier permeability of a filter media..."? or "A method of calculating the filtration characteristics of a filter media"?
- Claims 29-44 are rejected since they suffer the same defects as the claim from which they depend.

Claim Rejections - 35 USC ' 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. Claims 1 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by the publication entitled Air Permeability and Pore Distribution of a Dual-Layered Microglass Filter Medium in Vol. 6 of Advances in filtration and Separation Technology of the AFS Society 97-99 (1994), hereinafter "The A-P Reference". (Since it has not been shown how the structure of the filter media is effected by the calculations of the claims, claim 1 is interpreted as only being limited by the clearly structural limitations thereof.) The A-P Reference teaches a coarse fiber thickness layered against a fine fiber thickness and arranged such that the overall average pore size is smaller than the pore size of the finest layer (as in claim 1). This is shown in figure 1.

As for claim 6, the media would be separate face-to-face thicknesses since the filter is a "dual-layered" type.

Claim Rejections - 35 USC ' 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35

U.S.C. 103(a) are summarized as follows:

Determining the scope and contents of the prior art.

Ascertaining the differences between the prior art and the claims at issue.

Resolving the level of ordinary skill in the pertinent art.

Considering objective evidence present in the application indicating obviousness or nonobviousness.

13. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P Reference. As explained above, it is not seen how the equations developed by the applicant further structurally define the filter media of claim 1. The A-P reference teaches using ~~the~~ both the mean flow pore diameter and the air frazier permeability in the calculations for determining the average pore size [as in claims 12-13]. Using the ratio of the pore volume to the total volume of the medium is not specifically taught; however, it would have been obvious to the skilled man to use the fractional contribution of each layer to calculate the overall average pore size.

14. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P reference in view of Alkire et al. (U.S. 5,885,390) and Ahr (U.S. H1,909). Claim 2 has the limitation of a thickness of fibers that are carded and chopped and substantially opened and aligned. Alkire teaches fibers that are carded and chopped (col. 1, lines 40-50) and Ahr teaches fibers that are opened and aligned (col. 16, lines 60-65). It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the fibers of the A-P Reference to be carded and chopped since Alkire teaches the benefit glass fibers that are made into a filter (figure 5). It is considered that it would have been obvious to one ordinarily skilled in the art at

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the time of the invention to have the fibers of the A-P reference, as modified by Alkire, to be open and aligned, since Ahr teaches a product that is of uniform density and having a low level of defects (nits or knots, col. 16, lines 60-65).

15. Claims 3-4 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P Reference in view of Badolato et al. (U.S. 4,732,675). Claims 3 and 4 have limitations concerning the fiber sizes. Badolato teaches the denier of one thickness to be less than 6 (col. 2, lines 33-35) and the other to be at least six denier (col. 2, lines 47-49) [as in claim 3]. Badolato also teaches at least three different denier fibers of each being approximately 1-4, 6 and at least twenty (col. 2, lines 30-60) [as in claim 4] wherein the upstream thickness is coarser having a higher porosity and denier [as in claim 11]. It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the fiber denier sizes of Badolato in the A-P reference since Badolato teaches the benefit of filtering in a dual filter layer environment. It would also be obvious to optimize the denier size of the fibers depending upon the specific environment, type of liquid etc. in which the filter will operate in—as taught by De Villiers et al. (U.S. 5,480,464) at col. 5, lines 10-16 and as also realized by the applicant (page 8, lines 18-20).

16. Claims 5 and 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P reference in view of De Villiers. De Villiers teaches combined thicknesses of a filter media as being integral (col. 5, lines 35-55) [as in claim 5]. It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the integral

thicknesses of De Villiers in the invention of the A-P reference in order to have increased rigidity and stability (col. 5, lines 45-50).

De Villiers also teaches bonding means between layers (col. 5, lines 40-50) [as in claim 7] and fibers having low-melt characteristics for thermal bonding between layers [as in claim 8]. It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the bonding layer of De Villiers in the invention of the A-P Reference, since De Villiers in order to have increased rigidity and stability (col. 5, lines 45-50).

17. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P reference, in view of De Villiers, as applied to claim 7 above and in further view of Cusick et al. (U.S. 5,800,586). Cusick teaches a layer bonding means comprising a chemical binding agent that is an acrylic (col. 7, lines 10-22) [as in claims 9-10]. It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the binding of Cusick in the invention of A-P reference, as modified by De Villiers, since Cusick teaches the benefit of excellent adhesion between layers (col. 7, lines 15-22).

18. Claims 14-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P reference in view of De Villiers. Claims 14-17 have limitations concerning the length and percentage of denier sizes for the filter fibers. De Villiers teaches using a combination of low melt and regular fibers approximately 1-2 inches and of various fine, intermediate and coarse denier fiber sizes and percentages. It is considered that it would have been obvious to one

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ordinarily skilled in the art at the time of the invention to have the combination of fibers of De Villiers in the invention of the A-P reference since DeVilliers teaches the benefit of increased rigidity and stability (col. 5, lines 45-50). It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the specific sizes and percentages as in claims 14-17 since De Villiers teaches that the "relative percentages and components and fibers...will determining the performance of the efficient layer and will be selected bearing the desired characteristics in mind." The percentages would be chosen depending upon the intended use. It would also be obvious to optimize the denier size of the fibers depending upon the specific environment, type of liquid etc. in which the filter will operate in—as taught by De Villiers et al. (U.S. 5,480,464) at col. 5, lines 10-16 and as also realized by the applicant (page 8, lines 18-20).

19. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over the A-P reference in view of Alkire, Ahr and Badolato. The A-P reference has been expanded above and teaches a coarse fiber thickness layered against a fine fiber thickness and arranged such that the overall average pore size is smaller than the pore size of the finest layer; and calculations that include a pressure differential measurement for each layer taking into consideration the thickness or pore size of each layer and the mean flow pore diameter and the air frazier permeability [as in claim 18].

Alkire teaches fibers that are carded and chopped (col. 1, lines 15-20) and Ahr teaches fibers that are opened and aligned (col. 16, lines 40-50) [as in claim 18]. It is considered that it would have

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been obvious to one ordinarily skilled in the art at the time of the invention to have the fibers of the A-P Reference to be carded and chopped since Alkire teaches the benefit glass fibers that are made into a filter (figure 5). It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the fibers of the A-P reference, as modified by Alkire, to be open and aligned, since Ahr teaches a product that is of uniform density and having a low level of defects (nits or knots, col. 16, lines 60-65).

Badolato teaches at least three different denier fibers of each being approximately 1-4, 6 and at least twenty (col. 2, lines 30-60) wherein the upstream thickness is coarser having a higher porosity and denier. It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the fiber denier sizes of Badolato in the A-P reference, as modified by Alkire and Ahr, since Badolato teaches the benefit of filtering in a dual filter layer environment. It would also be obvious to optimize the denier size of the fibers depending upon the specific environment, type of liquid etc. in which the filter will operate in—as taught by De Villiers et al. (U.S. 5,480,464) at col. 5, lines 10-16 and as also realized by the applicant (page 8, lines 18-20).

20. Claims 19-22 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tani et al. (U.S. 4,731,135) in view of the A-P Reference. Tani discloses a method for manufacturing a layered filtering material comprising the steps of mixing fibers and carding them into a layer separately for two or more different layers and then spray binding them together wherein the upstream stream is a coarse layer and the downstream is a finer layer (see

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figures 2A and 5 and also col. 3, lines 40-48) [as in claims 19-22]. It is pointed out that applicant's claim does not require a step of chopping but the premixed separate fibers of Tani would be the same material of manufacture as a chopped fiber.

Although the layers of Tani are face-to-face, he does not specifically teach an arrangement wherein the overall average pore size is smaller than the average pore size of the finest layer and calculated using including factors of relative thicknesses and relative pore sizes. The A-P reference has been expanded above and teaches a coarse fiber thickness layered against a fine fiber thickness and arranged such that the overall average pore size is smaller than the pore size of the finest layer; and calculations that include a pressure differential measurement for each layer taking into consideration the thickness or pore size of each layer [as in claim 19]. It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the configuration of the A-P reference in the invention of Tani, since the A-P reference teaches the benefit of a layered media having increased filtration efficiency over the sum of the separate efficiencies of each layer.

As for claims 25 and 26, the A-P reference teaches using calculations involving the mean flow pore diameter and the air frazier permeability. Using the ratio of the pore volume to the total volume of the medium is not specifically taught; however, it would have been obvious to the skilled man to the fractional contribution of each layer to calculate the overall average pore size.

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21. Claims 23-24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tani, in view of the A-P reference, as applied to claim 19 above and in further view of De Villiers. Claims 23 and 27 have the further limitation of a low melt fiber. De Villiers teaches bonding means between layers and fibers having low-melt characteristics for thermal bonding between layers (col. 5, lines 40-50) and heating the bind the layers together [as in claim 24]. It is considered that it would have been obvious to one ordinarily skilled in the art at the time of the invention to have the thermo-bonding fibers of De Villiers in the invention of Tani, as modified by the A-P reference, since DeVilliers teaches the benefit of making a composite filter using heat—also goal of Tani.

Examiner's Note:

22. Since claims 28-44 are rejected under 35 U.S.C. 101 for not having a tangible and concrete result, and also under 35 U.S.C. 112 paragraphs 1 and 2, e.g. a method for calculating___ (what?), a rejection under 35 U.S.C. 102 and/or 103 has not been made. However, it is pointed out that the structural essence of applicant filter media, i.e. an overall average pore size of combined successive upstream and downstream layers of filter media that is smaller than that of the overall pore size of the finest fiber downstream layer, is taught in the A-P reference that also teaches formulas for calculating average pore size. And also that the structural elements of the dependent claims are taught in the aforementioned prior art used to reject the dependent claims of claim 1.

Response to Arguments

23. Applicant's arguments in the amendment of Paper no. 14 have been fully considered but are unpersuasive. Applicant has argued (page 2) that the A-P reference does not mention a "porosity" factor that in combination with other factors results in an overall average pore size of the combined successive thicknesses that is smaller than that of the average pore size of the finest fiber thickness so as to optimize filtration performance efficiency. However, as explained above, the A-P reference teaches a layered filtration media having an overall average pore size of the combined successive thicknesses that is smaller than that of the average pore size of the finest fiber thickness. Applicant has not shown how this filter media of the prior art structurally differs from the alleged novel claimed filter media nor how the calculations including a porosity factor would result in a structural difference.

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24. Contact Information:

- Examiner Mr. Terry K. Cecil can be reached at (703)305-0079 for any inquiries concerning this communication or earlier communications from the examiner. Note that the examiner is on the increased flextime schedule but can normally be found in the office during the hours of 8:00a to 4:30p, on at least four days during the week M-F.
- The group receptionist can be reached at (703)308-0661 for inquiries of a general nature or those relating to the status of this or proceeding applications.
- Wanda Walker, the examiner's supervisor, can be reached at (703)308-0457 if attempts to reach the examiner are unsuccessful.
- Fax numbers for this art unit are as follows:
 - i. (703)872-9310 for *official* faxes (i.e. faxes to be entered as part of the file history) that are not after-final; and
 - ii. (703)872-9311 if after-final.

TKC
April 9, 2003

Examiner Terry Cecil
A.U. 1723